

An Alternative to a New Roof

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Modern roofing technology has undergone the most explosive proliferation of new technologies, alternative systems, advancements, improvements, and a plethora of "latest and greatest" in its history. With these new technologies comes the responsibility of the roofing professional to familiarize him or herself with the current state-of-the-art.

For roofing jobs on existing buildings, the question faced by the roofing professional still remains the same: should an expensive new roof be installed or is there a retrofit alternative which will prolong the life of the existing roof? The answer may be a liquid-applied roof coating over the existing aged roof.

Roofing technologies include the traditional built-up roof (BUR), plus newer systems, such as various types of single ply and modified bitumen sheets and spray-applied polyurethane foam with a protective coating.

Since the 1980's, coatings are firmly established as an integral and required part of the urethane foam roofing system. The type of polyurethane used to make the foam is not durable if left uncoated and will begin to powder and degrade within weeks of application. Moreover, polyurethane foam is rather brittle and its skin can be cracked from impact with falling debris, heavy foot traffic, or severe hail storms. Coatings protect the foam from these potential mishaps.

Liquid-applied coatings have also proven their utility over other substrates, and can be used to protect, restore, and prolong the life of aged existing built-up or other conventional roofing systems. Unlike re-roofing alternatives, they are extremely lightweight, adding virtually nothing to the load on the roof deck or supporting structural members. In fact, roofs may be re-coated several times without contributing significantly to the load.

Because these coatings can be formulated white, they can be effectively used to impart reflectivity to the roof. This not only improves aesthetics, but also cools the roofing surface, contributing to longer service life. Since the surface of the roof is cooler, an additional benefit is a reduction in a demand for air conditioning. This has been well documented by National Coatings Corporation. The economic advantages of longer roof service life and reduced energy costs for air conditioning are the economic driving forces for reflective roof coatings. However, if aesthetics is a key objective, coatings can also be color tinted.

The Differences in Coatings

Technically, these coatings are much more than paints. By definition, they are liquid-applied, fully-adhered, elastomeric functional membranes formed in-situ on the existing roof. In the sense of being adherent to the substrate to which they are applied-in this case, the existing roof-they are paint-like. However, their elastomeric feature, which distinguishes them from paints, means they are also flexible. This flexibility, or elasticity, must exist not only at one temperature but over the temperature range existing in any particular building's climate. Elasticity enables the coating to tolerate a roof's movement as it responds to the stresses caused by temperature changes, settling of the foundation, weight loads caused by ice and snow, and seasonal expansion and contraction of the roofing envelope. These coatings are normally applied at film thicknesses of 20 to 30 dry mils (.020 inch to .030 inch) using a roller, spray, or brush. By comparison, paints are applied at two to three mils, thus making these roof coatings approximately ten times thicker than traditional paints.

Classes of Coatings

Roof coatings can be classified into three types: solvent, water-based, and 100 percent solids. Solvent systems are those containing an organic solvent as carrier for the coating. In this case, solvent evaporation causes the coating to form the membrane on the roof. Water-based coatings employ water as this carrier. The third class, albeit less common, is the solvent-free coating

where two liquid components are premixed in a specially designed airless spray unit; a chemical reaction causes some of these two-part coatings to dry almost immediately. Each of these three coating classes has specific advantages and disadvantages relating to the type and presence or absence of solvent.

Solvent Coatings

Coatings which employ organic solvents can be applied over a wide range of temperatures, including cold or marginal weather conditions. Moreover, they will dry quickly under conditions of high humidity since the rate of solvent evaporation is not related to relative humidity. These advantages are offset to some degree, however, because they contain large percentages of usually flammable, and sometimes highly toxic, organic solvents.

Additionally, many of these coatings are required to carry the D.O.T. classified "red label" associated with low flammability flash point. This means the applicator must exercise care and prudent handling procedures when transporting, storing, and applying such coatings. Also, since these systems contain organic solvents which may soften certain asphalt and other conventional roofing materials, they may cause "bleed through" problems or, even worse, permanent damage to the old roofing substrate. Rooftop air intakes must be masked to prevent vapors from entering the HVAC and ventilation systems.

Finally, when using these materials, additional solvent is required to clean the application equipment after use.

Water-Based Coatings

In contrast, water-based coatings eliminate the flammability and potential toxicity hazards associated with solvent systems since they use water-rather than solvent-as the carrier. Additionally, the equipment used can be easily cleaned with soap and water, and their potential for "bleed through" is significantly lower because they do not contain solvents. Since water is an inexpensive solvent, cost is usually lower than solvent-based coatings.

The chief limitation of water-based coatings is the range of atmospheric conditions conducive to application. First, they should not be applied at temperatures too close to freezing because the rate of water evaporation becomes so slow they may not dry properly. Normal low cut-off point for application of these coatings is 50 degrees F. Second, they should not be applied when rain or inclement weather is imminent.

Considerable progress in narrowing this application conditions gap between solvent- and water-based coatings has been made with a recent introduction to the marketplace of systems with "quick set" properties. National Coatings AcryShield A600 and A640 have this property and can adequately withstand heavy dew or light rain shortly after application.

100 Percent Solids Coatings

The third, less common type of roof coating consists of 100 percent solids. Since these coatings contain virtually no solvents, they do not possess the limitations of the water- or solvent-based coatings. However, they do require special application equipment and are extremely sensitive to changes in application temperature as their ability to form a durable, long-lasting membrane is dependent on proper mixing ratios of the two components and reaction temperature. If incorrect, the coating may not adequately cure or may, possibly, gel prematurely, thus preventing the protective membrane from forming properly.

Acrylic Coatings

Acrylic roof coatings take advantage of the inherent durability of acrylics, and can be designed to be very elastic and flexible over a wide temperature range for a relatively modest cost. In addition, they are supplied as either water- or solvent-based products, although specialized acrylic coatings are available for roofs experiencing ponded water conditions.

Conclusion

Liquid-applied roof coatings have proven themselves as useful tools for the roofing professional to restore and protect existing roofs. They are be extremely durable and used as the first-line of defense in the roofing envelope, offering further protection to other roof assembly components below.

The coating selected should be a result of a detailed assessment of the type and condition of the roof, the desired benefit, the capabilities and prescribed uses for the coating, and the economic considerations of the individual job. Liquid-applied roof coatings provide a means of prolonging the life of an existing roof, and are often an effective alternative to reroofing.